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3,347,229

LATCH OPERATED MICROPHONE SWITCH FOR BREATHING MASK

Filed Feb. 23, 1965

2 Sheets-Sheet 1

Fig. 1

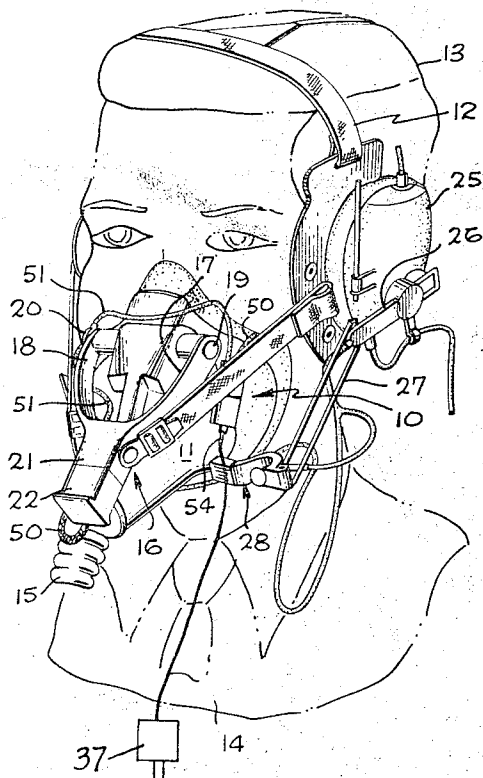


Fig. 2

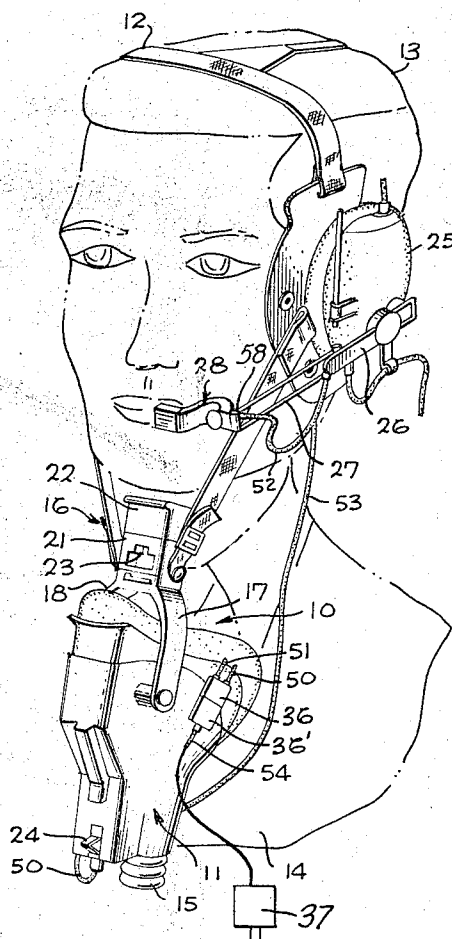
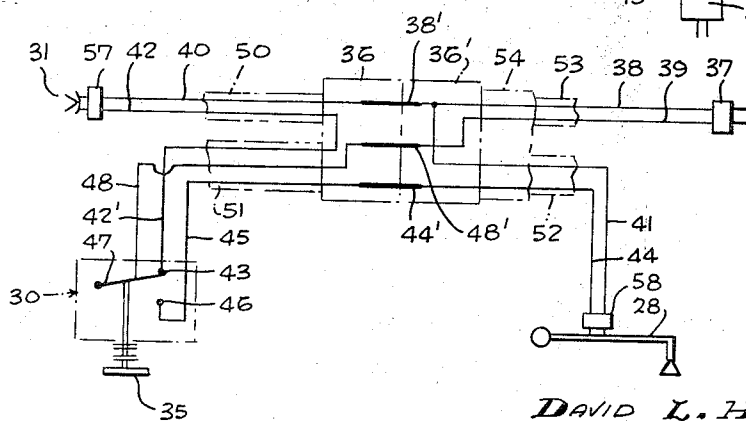


Fig. 3



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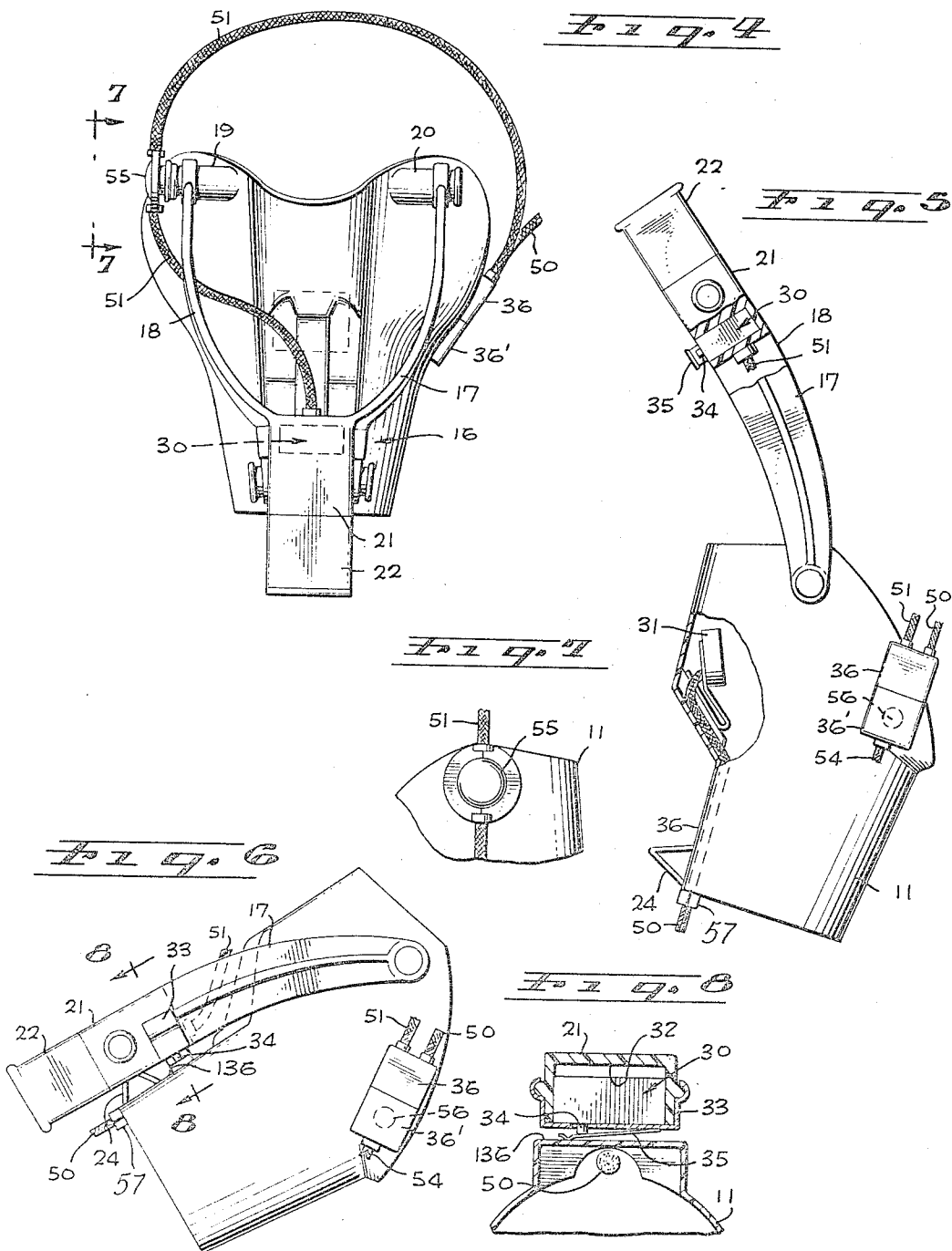
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4 Claims. (Cl. 128—146.3)

ABSTRACT OF THE DISCLOSURE

The invention herein disclosed has reference to incorporating into a quick operated latching device for an aviator's breathing mask a microphone switch-over mechanism which makes and breaks automatically, depending upon manipulation of the latching device, by means of which a circuit to the microphone is automatically closed and thereby energized when the mask is applied to the face and there latched in place, the mechanism being one which opens the circuit to the microphone automatically when the mask is disconnected and removed, the mechanism further being one energizing a separate boom mechanism when the latching device is disconnected, on those occasions when a boom mechanism is used as an adjunct.

In the embodiment shown, there are two microphones contemplated, one in the mask and the other on a boom. Each of the microphones has its own connection, and is adapted to receive impulses from a common source of supply. There is an automatic quick latching and unlatching device consisting of a catch mechanism on the mask and a complementary catch mechanism on a manipulating yoke. A switch-over mechanism, common to both microphones, is mounted on the yoke and adapted to be manipulated by a portion of the mask, when the yoke and the mask are in engagement to hold the mask on the operator's face. In this position, the switch-over mechanism energizes the microphone in the mask. When the catch is disengaged and the mask permitted to drop from the face, the switch-over automatically disconnects the mask microphone and connects the boom microphone to the source of sound.

A typical mask, to which the invention herein described is applicable, is illustrated in patent No. 3,234,939.

Breathing equipment of the type here under consideration consists of emergency breathing equipment designed to be used when needed in case of some failure of cabin pressure. In high flying aircraft currently employed considerable cabin pressure is maintained which, of course, prevails also in the pilot's compartment, at high altitudes, and this gives the crew of the aircraft great freedom and comfort during normal flight. There always remains, however, the possibility that cabin pressure could suddenly drop and this would soon incapacitate the crew should they not be promptly supplied with an auxiliary oxygen supply. For this reason, each member of the crew wears suspended from his neck and resting upon his chest a breathing mask which can be quickly swept into position upon the operator's face thereby to immediately give him access to an auxiliary oxygen supply. Considerable attention has been given to mechanical means making it possible to apply the mask to the face as quickly as possible and is directed to mechanism of this kind accompanied by a latching device capable of firmly anchoring the mask in its operating position, the mechanism being such that it can be easily operated even through the pilot might be flying with heavily gloved hands. The same quick acting mechanism has also been so designed as to be capable of quick and easy removal whenever the operator desires

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to discontinue use of the emergency oxygen supply. One shortcoming, however, in equipment of the type made reference to is the absence of a quick change-over from the boom microphone ordinarily used when the mask is not in place on the face to the microphone which is contained in the mask. In fact, the need for prompt communication on the part of the crew member in case of a quick change-over to auxiliary breathing equipment is virtually as urgent as is the need for auxiliary oxygen. Although easy operating manually thrown switches have been proposed, even this expedient consumes precious time on critical occasions which could well be used for other important functions of the crew.

It is therefore among the objects of the invention to provide a new and improved automatic switch-over device for a quick donning mask suspension which automatically switches on the microphone in the mask as it is placed in operating position on the operator's face.

Another object of the invention is to provide a new and improved automatic switch-over device which is capable of cutting off the boom microphone and simultaneously cutting in the mask microphone immediately upon placement of the mask on the face and which further operates to reverse the connections whenever the mask is removed from the face.

Still another object of the invention is to provide a new and improved microphone switch-over device which is so located on the mask assembly that it is operated simultaneously with operation of a mechanical catch or latching means which is depended upon normally for securing the mask suspension in operating condition on the face.

Still another object of the invention is to provide a new and improved automatic switch-over device for breathing masks which is constructed as part of the mask suspension mechanism and especially the latching mechanism, the switch-over device being well protected against damage while at the same time being simple, compact, and light in weight so as to present no weight problem either when suspended on the neck or in operating condition on the face and so as to present no impediment to the provision of a compact stream-lined over-all package.

Still further included among the objects of the invention is to provide a new and improved unitary switch-over device adapted to be mounted in the latch mechanism of a quick donning mask assembly in such fashion that the switch-over device can be removed as a unit for servicing and replacement without it being necessary to disassemble the mask suspension in any other fashion.

With these and other objects in view, the invention consists in the construction, arrangement, and combination of the various parts of the device, whereby the objects contemplated are attained, as hereinafter set forth, pointed out in the appended claims and illustrated in the accompanying drawings.

In the drawings:

FIGURE 1 is a front perspective view showing an operator wearing a breathing mask locked in position on the operator's face.

FIGURE 2 is a front perspective view similar to FIGURE 1 wherein the breathing mask has been dropped to a supported position on the chest and a boom microphone provided for communication.

FIGURE 3 is a wiring diagram of the microphone switching device.

FIGURE 4 is a plan view of the mask showing the switching device in its relative location.

FIGURE 5 is a side elevational view with parts partially broken away showing the location of the switching device and portions of the connections thereto when the mask is dropped to supported condition upon the chest.

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FIGURE 6 is a side elevational view showing the latch and switch in closed position.

FIGURE 7 is a fragmentary side elevational view of swivel support for the wire connection, on line 7—7 of FIG. 4.

FIGURE 8 is a cross-sectional view on the line 8—8 of FIGURE 6.

In an embodiment of the invention which has been chosen for the purpose of illustration, there is shown a mask suspension indicated generally by the reference character 10 and an attached mask 11 fastened by means of a head harness 12 upon the head 13 of an operator. In FIGURE 1 the mask 11 is shown in operating position covering the operator's nose and mouth. In FIGURE 2 the mask is shown released from operating position and in supported position upon the operator's chest 14. An oxygen supply line 15 is shown leading into the mask.

To connect the mask 11 to the head harness 12 use is made of a yoke 16 having legs 17 and 18. The legs are secured to the mask by respective pivotal connections 19 and 20. The yoke 16 and head harness 12 act together in a familiar over center relationship as shown in FIGURE 1, to hold the mask in position upon the operator's face. To further secure the yoke in operating position a body 21 of the yoke to which the legs 17 and 18 are attached is provided with a latch device featuring in part a knob 22. The knob includes an appropriate catch member 23 which is located within the interior of the body 21 and which is adapted to engage a catch bracket 24 mounted upon the mask. The knob 22 may, if desired, be provided with a spring return whereby after being pulled endwardly to release the catch from the catch bracket upon removal of the mask from the operating position of FIGURE 1 to the released supported position of FIGURE 2, the knob will be returned to initial position as shown in FIGURES 1, 2, 4, 5, and 6.

Following substantially conventional practice there is provided a set of earphones illustrated by the earphone 25 supported in a substantially conventional way in position overlying the operator's ear. Upon the earphone is mounted a support 26 upon which is pivoted an arm 27 of a boom microphone 28. The boom microphone is ordinarily connected to the communication system and provides the means by which the pilot can project his voice into the communication system. When the time comes to quickly don the mask, the boom microphone is swung manually out of position from in front of the operator's face by pivotally extending the arm 27.

After the boom microphone has thus been thrown out of the way the operator lifts the mask 11 from the position of FIGURE 2 to the position of FIGURE 1 and in this same quick donning operation knocks the yoke 16 to the over center position of FIGURE 1. Included in the invention is a switching mechanism embodied in part in a switch 30 by means of which circuit to the boom microphone 28 is cut and a circuit to a mask microphone 31, shown in FIGURE 5, is closed whereby to interconnect the mask microphone 31 to the communication system.

The switch 30 is a unitary device entirely housed within the body of the switch. In turn there is provided a chamber 32 in the body 21 of the yoke 16, as shown to good advantage in FIGURE 8, wherein a spring clip 33 is employed to releasably hold the switch 30 in the position shown. An outwardly urged spring plunger 34 is normally extended into engagement with a resilient trip arm 35. When the yoke is moved into operating position as shown in FIGURE 1 and the knob 22 together with the catch member 23 and catch bracket 24 interengaged, the body 21 is held in the position shown in FIGURE 8. In this position the resilient trip arm 35 is pressed against an area 136 of the mask 11 and the spring plunger 34 is forced inwardly. This operation is for the purpose of disconnecting the boom microphone 28 and connecting the mask microphone 31.

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Contrarily, when the yoke is released by withdrawing the knob 22 and the body 21 thereupon is removed from the position of FIGURE 1 to, ultimately, the position of FIGURE 2, the spring plunger 34 is extended against the moderate resilient resistance of the trip arm 35 and the switching is reversed.

In order to appreciate and understand the switching mechanism reference is made to the wiring diagram of FIGURE 3. As shown, a connection consisting of mating parts 36 and 36' interconnects opposite portions of the wiring system. A plug 37 is designed to plug into a source of communication exemplified by a radio set of the airplane (not shown) and from which extends a supply lead 38 and a return lead 39. From the supply lead 38 a pin 38' connects with a lead 40 and supplies the mask microphone 31. A similar lead 41 of the supply lead connects to the boom microphone 28. A return line 42 from the mask microphone, which for convenience is lead back to the part 36 of the connection passes by way of a line 42' to a switch point 43 in the switch 30. A return line 44 from the boom microphone passes by way of a pin 44' to the part 36 of the connection, thence through a line 45 to a switch point 46 in the switch 30. Switch elements are embodied in part in an armature 47 and switch points 43 and 46. The armature 47 in the switch, which can be thrown into contact with either the switch point 43 or the switch point 46, is connected by a return line 48 to the part 36 of the connection, crossing over by means of an appropriate pin 48' to the return line 39 of the plug 37.

From the diagram of FIGURE 3 it will be understood how, when the yoke 16 is latched in the position of FIGURES 1, 6, and 8, connection is made to the mask microphone 31 by reason of closing the armature 47 against the switch point 43 at which time the armature is removed from the switch point 46 thereby to disconnect the boom microphone. Conversely, when the yoke is removed by unlatching the knob 22 the armature 47 is extended by spring action thereby to connect the armature to the switch point 46, at the same time breaking connection with the switch point 43. In this way the mask microphone is disconnected and the boom microphone automatically connected.

What is of paramount significance is that no special manual switching means need be resorted to. The switch operates automatically whenever the yoke is positioned in one or another of the two positions. That is to say when the yoke is latched in position upon the mask to hold the mask against the operator's face the resilient trip arm 35 will automatically be depressed, simultaneously depressing the plunger 34 which interconnects the mask microphone and disconnects the boom microphone. Whenever on the other hand the knob 22 is pulled out to unlatch the yoke 16, this mechanical unlatching motion alone is sufficient to permit the switch 30 to be moved to a new position and the armature 47 then automatically extends itself to reverse the switching.

In the interest of convenience and to permit ready removal of electric portions of the device from the mask suspension the switch 30 is made in the form of a switch box which can be merely inserted into the chamber 32 as previously described and there clipped in place by means of the spring clip 33. A cable jacket 50 housing the extension 40 and return line 42 joins the part 36 of the connection. A similar cable jacket 51 housing the line 42', the line 45 and the return line 48 also communicates with the part 36 of the connection. Similarly, a cable jacket 52 houses the extension 41 and extension 44 from the boom microphone, and a cable jacket 53 houses the supply lead 38 and return lead 39 to the plug 37. The cable jackets 52 and 53 may be joined by a Y-connection if preferred to a common cable jacket 54.

To hang the cable jacket 50 in a proper working location, a swivel snap 55 supports the cable jacket adjacent the pivotal connection 19. On the opposite side another swivel snap 56 supports the connection comprising the

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parts 36 and 36' upon the lower portion of the mask 11. When a plug 57 is employed to connect the electrical system to the mask of microphone 31 and a similar plug 58 is employed to connect the electrical system to the boom microphone 28, it will be clear that the wiring in company with the switch 30 can be entirely removed without it being necessary to disconnect any other portion of the mask, including the mask microphone and the boom microphone. Also by virtue of employment of the connection consisting of the parts 36 and 36' even the wiring system can be separated one part from another permitting removal of one part without of necessity removing the other. Of special importance as already noted is the unitary make-up of the circuitry and the attached mechanical portions of the circuitry in such guise that it is entirely separate from the mask and mask suspension elements but is readily connected to the mask and mask suspension in a manner which makes the connection and disconnection of electric portions of the device a part of the mechanical functioning of the mask suspension. In operating condition accordingly, both electrical and mechanical portions of the device work together as a single harmonious combination.

While the invention has herein been shown and described in what is conceived to be the most practical and preferred embodiment, it is recognized that departures may be made therefrom within the scope of the invention, which is not to be limited to the details disclosed herein but is to be accorded the full scope of the claims so as to embrace any and all equivalent devices.

Having described the invention, what is claimed as new in support of Letters Patent is:

1. An automatic switching system for use with an aviation breathing mask device comprising a mask suspension means therefor, a mask microphone electric connection for the mask and a source of communication having an electric connection therefor, said mask suspension means comprising including a yoke and swivel connections between said yoke and the suspension means, said switching system comprising a catch means on the yoke, complementary catch means on the mask adapted to engage said first catch means and a release knob operably attached to one of said catch means and an electric harness interconnecting said electric connections, an automatic switch unit on said yoke and connected in said electric harness having an element thereof connected to one of said electric connections and an armature connected to the other of said connections, said armature being engageable with said element, and an operator on said armature extending to a position of potential engagement with said mask, said operator having one position of engagement with said mask when the yoke is in latched position of engagement with the mask and the armature is in a position closing a circuit to said electric connections, said operator having a release position out of engagement with the mask when the yoke is released therefrom wherein the armature is in a position opening the circuit to said connections.

2. An automatic switching system for use with an aviation breathing mask device comprising a mask suspension means, a mask microphone connection in the mask, a boom microphone connection and a source of communication, said mask suspension means comprising a yoke and swivel connections between said yoke and the suspension means, said switching system comprising a catch means on the yoke, complementary catch means on the mask adapted to engage said first catch means and a release knob operably attached to one of said catch means and an electric harness interconnecting said microphone connections and said source of communication, an automatic switch unit on said yoke and connected in said electric harness having elements thereof connected respectively to said microphone connections and an armature alternatively engageable with said elements, and an operator on said armature extending to a position of po-

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tential engagement with said mask, said operator having one position of engagement with said mask when the yoke is in a latched position of engagement with the mask and the armature is in a position closing a circuit to said mask microphone connection and opening a circuit to the boom microphone connection, said operator having a release position out of engagement with the mask when the yoke is released therefrom wherein the armature is in a position closing the circuit to the boom microphone connection and opening the circuit to the mask microphone connection.

3. An automatic switching system for use with an aviation breathing mask device comprising a mask suspension means thereon, a mask microphone connection in the mask, a boom microphone connection and a source of communication, said mask suspension means comprising a yoke and swivel connections between said yoke and the suspension means, said switching system comprising a catch means on the yoke, complementary catch means on the mask adapted to engage said first catch means and a release knob operably attached to one of said catch means and an electric harness interconnecting said microphone connections and said source of communication, an automatic switch unit in said electric harness having elements thereof connected respectively to said microphone connections and an armature alternatively engageable with said elements, said yoke having a chamber therein, releasable means holding said switch unit releasably in said chamber and an operator on said armature extending to the exterior of said switch unit and to a position of potential engagement with said mask, said operator having one position of engagement with said mask then the yoke is in a latched position of engagement with the mask and the armature connection is in a position closing a circuit to said mask microphone and opening a circuit to the boom microphone connection, said operator having a release position out of engagement with the mask when the yoke is released therefrom wherein the armature is in a position closing the circuit to the boom microphone connection and opening the circuit to the mask microphone connection.

4. An automatic switching system for use with an aviation breathing mask device comprising a head harness, a breathing mask, a mask suspension means having an operating position holding the mask on the face of an operator and a release position supporting the mask at a lowered location, a mask microphone connection in the mask, a boom microphone connection and a source of communication, said mask suspension means comprising straps, a yoke having legs, pivotal connections between the legs and the mask, a body and swivel connections between said body and the straps, said switching system comprising a catch means on the body, complementary catch means on the mask adapted to engage said first catch means and a release knob operably attached to the one of said catch means, and an electric harness interconnecting said microphone connections and said source of communication, an automatic switch unit in said electric harness having elements thereof connected respectively to said microphone connections and an armature alternatively engageable with said elements, said body having a chamber therein, releasable means holding said switch unit releasably in said chamber and an operator on said armature extending to the exterior of said switch unit and to a position of potential engagement with said mask, said operator having one position of engagement with said mask when the yoke is in a latched position of engagement with the mask and the armature connection is in a position closing a circuit to said mask microphone connection and opening a circuit to the boom microphone connection, said operator having a release position out of engagement with the mask when the yoke is released therefrom wherein the armature is in a position closing

the circuit to the boom microphone connection and opening the circuit to the mask microphone connection.

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